## REMARKS

The Office Action dated May 22, 2008 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1, 3-11, 14, 15, 20, 22, 24, 26-29 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Claim 2 has been canceled without prejudice or disclaimer. Claims 30-33 are newly added. No new matter has been added and no new issues are raised which require further consideration or search. Claims 1-17 and 20-33 are presently pending

Claims 1, 5, 6, 15, 16, 20-24, and 26-29 were rejected under 35 U.S.C. §102(e) as being anticipated by Haas (U.S. Patent No. 6,304,556). The Office Action took the position that Haas discloses all of the elements of the claims. This rejection is respectfully traversed for at least the following reasons.

Claim 1, upon which claim 21 is dependent, recites a system including a first-tier mesh formed of a plurality of first-tier nodes. Each of the first-tier nodes of the plurality of first-tier nodes are configured to communicate data within the first tier with at least selected others of the first-tier nodes. At least one of the first-tier nodes forms a first-tier sink node. The system also includes at least a second-tier mesh formed of a plurality of second-tier nodes. Each of the second-tier nodes of the plurality of second-tier nodes is configured to communicate data within the second tier with at least selected others of the second-tier nodes, and at least one of the second-tier nodes forms a second-tier sink node.

The second-tier sink node is further configured to communicate with the first-tier sink node of the first-tier mesh. The system is configured to provide radio communication of data therein. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. The first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different.

Claim 5, upon which claims 6-7 are dependent, recites a system including a first-tier mesh formed of a plurality of first-tier nodes. Each of the first-tier nodes of the plurality of first-tier nodes is configured to communicate data within the first tier with at least selected others of the first-tier nodes. At least one of the first-tier nodes forms a first-tier sink node. The system also includes at least a second-tier mesh formed of a plurality of second-tier nodes. Each of the second-tier nodes of the plurality of second-tier nodes is configured to communicate data within the second tier with at least selected others of the second-tier nodes. At least one of the second-tier nodes forms a second-tier sink node. The second-tier sink node is further configured to communicate with the first-tier sink node of the first-tier mesh. The first-tier mesh comprises an ad-hoc mesh which exhibits an ad-hoc configuration and an ad-hoc number of first-tier nodes. The system is configured to provide radio communication of data therein. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh

operation characteristics. First-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics are different.

Claim 15, upon which claims 16-17 are dependent, recites a system including a first-tier mesh formed of a plurality of first-tier nodes. Each of the first-tier nodes of the plurality of first-tier nodes capable of communicating data within the first tier with at least selected others of the first-tier nodes. At least one of the first-tier nodes forms a first-tier sink node. The wireless access network also includes at least a second-tier mesh formed of a plurality of second-tier nodes. Each of the second-tier nodes of the plurality of second-tier nodes is capable of communicating data within the second tier with at least selected others of the second-tier nodes, at least one of the second-tier nodes forms a second-tier sink node, the second-tier sink node is further capable of communicating with the first-tier sink node of the first-tier mesh. The at least one of the first-tier nodes forming the first-tier sink node comprises a first first-tier node forming a first first-tier sink node and at least a second first-tier node forming a second first-tier sink node. The at least one of the second-tier nodes which forms the second-tier sink node includes a first second-tier node forming a first second-tier sink node and at least a second, second-tier node forming a second second-tier sink node. The first first-tier sink node is capable of communicating with the first second-tier sink node. The second first-tier sink node is capable of communicating with the second second-tier sink node. The first and second second-tier sink nodes, respectively, are configured to communicate therebetween. The system is configured to provide radio communication of data. The first-tier nodes of the

first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 20 recites a method including forming a wireless access network providing for communication therein. The method further includes forming a first-tier mesh of a plurality of first-tier nodes, each of the first-tier nodes capable of communicating data within the first tier with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The method also includes forming a second-tier mesh of a plurality of second-tier nodes, each of the second-tier nodes of the plurality of second-tier nodes configured to communicate data within the second tier with at least selected others of the second-tier nodes, at least one of the second tier nodes forming a second-tier sink node further configured to communicate with the first-tier sink node of the first-tier mesh formed during the operation of forming the second-tier mesh. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics, and wherein the second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics, a first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different.

Claim 22, upon which claims 3, 4, 6, 7 and 23 are dependent, recites an apparatus that includes at least one first-tier node. The at least one first-tier node is configured to

form a first-tier mesh, and the apparatus is configured to communicate data within the first tier with at least selected others of the at least one first-tier node and to communicate data with a second-tier sink node of a second-tier network. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 24, upon which claim 25 is dependent, recites an apparatus that includes at least one second-tier node. The at least one second-tier node is configured to form a second-tier mesh. The apparatus is configured to communicate data within the second tier with at least selected others of the at least one second-tier node and to communicate data with a first-tier sink node of a first-tier mesh. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 26 recites an apparatus that includes at least one first-tier node. The at least one first-tier node is configured to form a first-tier mesh. The apparatus further includes means for communicating data within the first tier with at least selected others of the at least one first-tier node. The apparatus also includes means for communicating data with a second-tier sink node of a second-tier network. The first-tier nodes of the first-tier

mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 27 recites an apparatus that includes at least one second-tier node. The at least one second-tier node is configured to form a second-tier mesh. The apparatus further includes means for communicating data within the second tier with at least selected others of the at least one second-tier node, and means for communicating data with a first-tier sink node of a first-tier mesh. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 28, upon which claims 30-33 are dependent, recites a method including forming a first-tier mesh using at least one first-tier nodes. The method also includes communicating data within the first tier with at least selected others of the at least one first-tier nodes. The method further includes communicating data with a second-tier sink node of a second-tier network. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics.

First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

Claim 29 recites a method including forming a second-tier mesh using at least one second-tier node. The method also includes communicating data within the second tier with at least selected others of the at least one second-tier nodes, and communicating data with a first-tier sink node of a first-tier mesh. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and second-tier-mesh operational topological characteristics are different.

As will be discussed below, Haas fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the features discussed above.

As discussed in the previous Response, Haas discloses two network communication protocols, one for routing and one for mobility management, that are suited for use with ad-hoc networks.

The routing protocol is a proactive-reactive hybrid routing protocol that limits the scope of the proactive procedure to the node's local neighborhood. Routing zones are defined for each node that include nodes whose distance from the subject node in hops is at most some predefined number, referred to as the zone radius. Each node is required to know the topology of the network within its routing zone only. The reactive procedure is limited during route discovery to queries of only those nodes located on the periphery of

routing zones. In this manner, the queries hop across nodes in distances of zone radius, thus limiting the scope of the reactive procedure. The zone radius is preferably adjustable to accommodate different and differing network topologies and network operational conditions in the most efficient manner.

The mobility management protocol relies on some network nodes assuming the mobility management function. In this scheme, each network node is "associated" with one or more mobility management nodes. The mobility management nodes form a virtual network which is embedded within the actual ad-hoc network. Each mobility management node knows the location of all nodes within its zone, and communicates this information to any other mobility management node that requests it.

Applicants respectfully submit that Haas fails to disclose or suggest all of the elements of the present claims. For instance, Haas fails to disclose or suggest "the first-tier nodes of said first-tier mesh are operable pursuant to first-tier-mesh operational characteristics, and wherein the second-tier nodes of said second-tier mesh are operational pursuant to second-tier-mesh operation characteristics, a <u>first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different</u>, as recited, in part, in independent claim 1 and similarly in the other pending independent claims 1, 5, 8, 11, 15, 20, 22, 24 and 26-29 (emphasis added).

Regarding topological configurations disclosed in Haas, the two-tier ad-hoc network illustrated in FIG. 3 of Haas is limited to only one actual physical tier and one

(second) logical or virtual tier that is derived from the nodes of the first-tier. Referring to column 8, lines 37-65 of Haas, the tier-2 network is based on the cluster "heads" of the tier-1 network and is not an independent network with separate nodes and communication protocols. At best, the two-tier network configuration of Haas probably uses tunneling between the tier-2 nodes which physically reside in the tier-1 network. There are no different network topologies between the two tiers disclosed in Haas. Therefore, Haas cannot possibly teach "first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different" for at least the reason that the nodes in the tier-2 network are the same nodes in the tier-1 network.

In addition to the above noted deficiencies of Haas, nowhere does Haas disclose or suggest the first tier sink nodes and second tier sink nodes of the present invention. Rather, Haas discloses "a plurality of network nodes 22 that are partitioned into four clusters 24, 26, 28 and 30, each of which forms a corresponding tier-1 network. In each cluster, one node labeled CH1, CH2, CH3 and CH4, respectively, is chosen to be a cluster head. The cluster heads thus form a tier-2 network 32" (see column 8, lines 40-45 of Haas). Accordingly, the second tier is just formed of cluster heads from the first tier. As such, Haas only discloses a plurality of tier-1 nodes, some of which (the cluster heads) also form tier-2. Therefore, Haas does not disclose "at least one of the first-tier nodes forming a first-tier sink node," and "at least one of the second-tier nodes forming a second-tier sink node, the second-tier sink node further configured to communicate data with the first-tier sink node of said first-tier mesh."

Accordingly, Haas fails to disclose or suggest all of the elements of claims 1, 5, 15, 20, 22, 24, and 26-29. Claims 6, 16, 21, and 23 are dependent upon claims 5, 15, 20, and 22, respectively. As such, claims 6, 16, 21, and 23 should be allowed for at least their dependence upon claims 5, 15, 20, and 22, and for the specific limitations recited therein. Withdrawal of the rejection of claims 1, 5, 6, 15, 16, 20-24, and 26-29 is respectfully requested.

Claims 2, 3, 8, 9, 11-13, 17, and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Haas in view of Liu (U.S. Patent No. 6,980,537). The Office Action took the position that Haas discloses all of the elements of the claims except for first tier mesh operational characteristics and the second tier operation characteristics being different. The Office Action then relied on Liu as allegedly curing those deficiencies of Haas. This rejection is respectfully traversed for at least the following reasons.

Claim 8, upon which claims 9-10 are dependent, recites a system which includes a first-tier mesh formed of a plurality of first-tier nodes. Each of the first-tier nodes of the plurality of first-tier nodes configured to communicate data within the first tier with at least selected others of the first-tier nodes, at least one of the first-tier nodes forming a first-tier sink node. The system also includes at least a second-tier mesh formed of a plurality of second-tier nodes. Each of the second-tier nodes of the plurality of second-tier nodes capable of communicating data within the second tier with at least selected others of the second-tier nodes. At least one of the second-tier nodes forming a second-

tier sink node. The second-tier sink node is further configured to communicate with the first-tier sink node of the first-tier mesh. The second-tier mesh includes a pre-configured mesh which exhibits a fixed configuration and a fixed number of second-tier nodes. The system is configured to provide radio communication of data therein. The first-tier nodes of said first-tier mesh are operable pursuant to first-tier-mesh operational characteristics The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. First-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics are different.

Claim 11, upon which claims 12-14 are dependent, recites a system that includes a first-tier mesh formed of a plurality of first-tier nodes. Each of the first-tier nodes of the plurality of first-tier nodes are configured to communicate data within the first tier with at least selected others of the first-tier nodes. At least one of the first-tier nodes forms a first-tier sink node. The system further includes at least a second-tier mesh formed of a plurality of second-tier nodes. Each of the second-tier nodes of the plurality of second-tier nodes configured to communicate data within the second tier with at least selected others of the second-tier nodes. At least one of the second-tier nodes forming a second-tier sink node. The second-tier sink node is further configured to communicate with the first-tier sink node of the first-tier mesh, and a third-tier mesh formed of a plurality of third-tier nodes. Each of the third-tier nodes of the plurality of third-tier nodes is configured to communicate data with at least selected others of the third-tier nodes. At least one of the third-tier nodes forms a third-tier sink node. The system is configured to

provide radio communication of data therein. The first-tier nodes of the first-tier mesh are operable pursuant to first-tier-mesh operational characteristics. The second-tier nodes of the second-tier mesh are operational pursuant to second-tier-mesh operation characteristics. A first-tier-mesh operational topological characteristic and a second-tier-mesh operational topological characteristic are different.

As will be discussed below, the combination of Haas and Liu fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the features discussed above.

Haas is discussed above. Liu discloses a system and method for cluster formation within a communications network by utilizing network topology information to designate network nodes that are crucial for relaying traffic as cluster head nodes, while the remaining network nodes are designated as member nodes. Liu adjusts a node status packet transmission rate or interval between successive node status packet transmissions to facilitate cluster formation independent of network size and varying initial start times of network nodes. This cluster formation is utilized to form a three tier architecture for transmission or flooding of routing information from head node databases throughout the network.

Applicants respectfully submit that the combination of Haas and Liu fails to disclose or suggest all of the elements of the present claims. For example, Haas and Liu do not disclose or suggest "The first-tier nodes of said first-tier mesh are operable pursuant to first-tier-mesh operational characteristics, and wherein the second-tier nodes

of said second-tier mesh are operational pursuant to second-tier-mesh operation characteristics, a first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different," as recited in claim 8 and similarly recited in claim 11.

Liu, like Haas, does not disclose any elements which correspond to the different topological characteristics in the manner prescribed by the claims. Accordingly, the combination of Haas and Liu fails to disclose these limitations of the claims. <u>Liu is limited to using different frequencies as the sole functional difference between the operating conditions of the different mesh networks</u> (see column 6, lines 49-58 of Liu) (emphasis added). The topologies used in the different-tier networks of Liu do not provide different operational topological characteristics between the individual tiers.

Furthermore, the combination of Haas and Liu does not disclose or suggest "wherein said second-tier mesh comprises a pre-configured mesh which exhibits a fixed configuration and a fixed number of second-tier nodes," as recited in claim 8. The Office Action cited Liu as allegedly disclosing this limitation of the claims (Office Action, page 7). However, Liu only discloses that the head nodes form a second tier 160 where each node within that tier is a head node (see column 14, lines 40-45 of Liu).

In addition to the above noted deficiencies of Liu, the teachings of Liu teach away from a pre-configured mesh with a fixed configuration because the configuration of Liu is a dynamic network configuration. Column 14, lines 27-61 of Liu describes how a dynamic tier forming system operates by continually forming the head nodes and super

nodes of the second and third-tiers, respectively. This dynamic tier forming system of Liu teaches away from the fixed network configuration of claim 8. It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Therefore, Liu may not be combined with Haas to teach the subject matter of claim 8.

In addition, the combination of Haas and Liu fails to disclose or suggest "a third-tier mesh formed of a plurality of third-tier nodes, each of the third-tier nodes of the plurality of third-tier nodes configured to communicate data with at least selected others of the third-tier nodes, at least one of the third-tier nodes forming a third-tier sink node," as recited in claim 11. The Office Action again took the position that Liu discloses this limitation of the claims (Office Action, page 8). Applicants respectfully disagree.

Liu merely discloses that "nodes 10(1)-10(11) of network 200 are initially within a first tier 150. Cluster formation is performed by the first tier nodes where nodes 10(3), 10(6) and 10(9) are designated as head nodes 14(3), 14(6) and 14(9). These head nodes form a second tier 160 where each node within that tier is a head node. The head nodes of tier 160 perform cluster formation as described above and node 14(6) is designated as a super node 15(6). The super node forms a third tier 170" (see column 14, lines 37-45 of Liu). Liu describes that some of the first tier nodes are designated as head nodes which form a tier of head nodes. One of the head nodes is then designated as a super node, which forms a third tier. As such, Liu discloses that one of the first tier nodes (i.e. 14(6)) is designated as a third tier. Liu, however, does not disclose or suggest "a third-tier mesh

formed of a plurality of third-tier nodes,... at least one of the third-tier nodes forming a third-tier sink node," as recited in claim 11. Moreover, Liu and Haas do not disclose or suggest a third-tier sink node for the reasons discussed above. Accordingly, the combination of Haas and Liu fails to disclose or suggest all of the elements of claim 11.

As stated above, the combination of Haas and Liu do not teach all of the subject matter of independent claims 8 and 11. By virtue of dependency, claims 9, 12, 13, 17 and 25 are also allowable over Haas and Liu, and claims 2 and 3 are allowable over Haas for the reasons described above with respect to claim 1. In addition, Liu does not teach the deficiencies of Haas with respect to claim 1, and thus Liu fails to teach the subject matter of claims 2 and 3 which are dependent thereon. Withdrawal of the rejection of claims 2, 3, 8, 9, 11-13, 17 and 25 is respectfully requested.

Claims 4 and 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over Haas in view of Acampora (U.S. Patent No. 6,751,455). The Office Action took the position that Haas discloses all of the elements of the claims except for co-located first and second tier nodes. The Office Action then relied on Acampora as allegedly curing those deficiencies of Haas. This rejection is respectfully traversed for at least the following reasons.

Haas is discussed above. Acampora discloses a radio link management system for a home or office including an ad hoc network of agents wirelessly communicating among themselves, while clients wirelessly communicate with proximate agents. Control of the network may be centralized in a network controller integrated with an agent, or may be

distributed upon the network of agents. Some of the agents, which may include an agent that is also the network controller, serve as a gateway device which connects to a worldwide communications network external to the home or office. Parameters for radio communication are allocated ad hoc in a manner which is client-dependent, and uses the least power from the battery-powered client. The agents establish an ad-hoc network among themselves, with routing among and between the agents being both multi-hop and "minimum hop" to conserve bandwidth.

Claims 4 and 7 are dependent upon claims 1 and 5, respectively. As discussed above, Haas fails to disclose or suggest all of the elements of claims 1 and 5. Additionally, Acampora does not cure the deficiencies in Haas, as Acampora also fails to disclose or suggest "the first-tier nodes of said first-tier mesh are operable pursuant to first-tier-mesh operational characteristics, and wherein the second-tier nodes of said second-tier mesh are operational pursuant to second-tier-mesh operation characteristics, a first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different", as recited, in part, in independent claim 1 and similarly in the other pending independent claims 1, 5, 8, 11, 15, 20, 22, 24 and 26-29. Therefore, the combination of Haas and Acampora fails to disclose or suggest all of the elements of claims 4 and 7. Furthermore, claims 4 and 7 should be allowed for at least their dependence upon claims 1 and 5, and for the specific limitations recited therein.

Claims 10 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Haas in view of Liu, and further in view of Acampora. The Office Action took the

position that Haas and Liu disclose all of the elements of the claims except for the communication data being effectuated to a non line of sight type of communications. The Office Action then relied on Acampora as allegedly curing those deficiencies of Haas and Liu. This rejection is respectfully traversed for at least the following reasons.

Claims 10 and 14 are dependent upon claims 8 and 11, respectively. As discussed above, Haas and Liu fail to disclose or suggest all of the elements of claims 8 and 11. Additionally, Acampora does not cure the deficiencies in Haas and Liu, as Acampora also fails to disclose or suggest "the first-tier nodes of said first-tier mesh are operable pursuant to first-tier-mesh operational characteristics, and wherein the second-tier nodes of said second-tier mesh are operational pursuant to second-tier-mesh operation characteristics, a first-tier-mesh operational topological characteristics and a second-tier-mesh operational topological characteristics being different", as recited, in part, in independent claim 1 and similarly in the other pending independent claims 1, 5, 8, 11, 15, 20, 22, 24 and 26-29. Therefore, the combination of Haas, Liu and Acampora fails to disclose or suggest all of the elements of claims 10 and 14. Furthermore, claims 10 and 14 should be allowed for at least their dependence upon claims 8 and 11, and for the specific limitations recited therein.

For at least the reasons outlined above, Applicants respectfully submit that the cited prior art fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated

and unobvious. It is therefore respectfully requested that all of claims 1-17 and 20-33 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

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Enclosure: Additional Claims Fee Transmittal

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